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Social Skills Training for Youth with Autism Spectrum Disorders

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Social skill deficits are a pervasive and enduring feature of autism spectrum disorders (ASD) [1–5]. Deficits in social functioning are prominent in childhood and persist throughout adulthood. According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*) [6], essential diagnostic criteria in the social domain include:

> (a) marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction; (b) failure to develop peer relationships appropriate to developmental level; (c) a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people; and (d) lack of social and emotional reciprocity.

Qualitative impairments in reciprocal social interaction are also a diagnostic imperative according to the *International Statistical Classification of Diseases, 10th Revision* (*ICD-10*) [7]. *ICD-10* lists difficulties interpreting socio-emotional cues, including failure to adapt behavior and emotion to social context and deficits in nonverbal communication, as essential social features of autism spectrum disorder (ASD). Social skill deficits have been linked to other deleterious outcomes, such as poor academic performance, peer rejection, isolation, social anxiety, depression, and other forms of psychopathology [8–10]. As such, there is a significant need for clinicians to develop effective, empirically tested social skill interventions. The purpose of this article is to provide a review of social skills training (SST) procedures that have been empirically tested via research. In addition, the article discusses social skills assessment procedures

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available to clinicians serving youth with ASD. The article concludes by presenting recommendations elucidated by meta-analytic reviews of social skill interventions.

An overview of social skills training

SST refers to instruction designed to improve or facilitate the acquisition or performance of social skills. Social skills are "socially acceptable learned behaviors that enable a person to interact with others in ways that elicit positive responses and assist in avoiding negative responses" [11]. Social skills are distinguished from social competence, in that social skills represent social behaviors, and social competence represents judgments or perceptions of those behaviors by others [12]. The distinction between social skills and social competence has important implications for the selection of outcome measures and the monitoring of treatment progress (the assessment of social functioning is discussed more comprehensively in a later section of this article). SST typically addresses three primary objectives: to promote skill acquisition, to enhance existing skills, and to facilitate the generalization of skills across settings and persons. Though SST programs vary considerably, most SST programs incorporate one or more of the following treatment modalities: modeling, coaching, social problem solving, behavior rehearsal, feedback, and reinforcement-based strategies [13].

Elliot and Gresham [11] discuss five factors that contribute to social skills deficits: (1) lack of knowledge, (2) lack of practice or feedback, (3) lack of cues or opportunities, (4) lack of reinforcement, and (5) the presence of interfering problem behaviors. These five factors are highly salient to the social skill deficits in youth with ASD. Youth with ASD often exhibit lack of knowledge regarding basic social functioning, such as how to initiate interactions, respond to the initiations of others, read nonverbal cues, infer the thoughts and feelings of others, and regulate their physiologic response to stressful situations. Youth with ASD also lack opportunities to perform social skills because of a high degree of social withdrawal. Intense isolation may preclude the child from practicing newly learned skills. Poor social skills may also lead to negative peer interactions. As such, youth with ASD may receive little to no reinforcement from peers in social situations or, worse, experience frequent aversive interactions with peers. Finally, youth with ASD may exhibit interfering problem behaviors that significantly derail social interactions, such as behaving aggressively, making inappropriate comments, talking out of turn, or violating the personal space of others. Effective SST entails designing assessment practices to identify the factors contributing to the social failure of the child with ASD, and then delivering SST strategies to ameliorate the specific areas of deficiency.

Specific social skills training strategies

McConnell [14] provides a taxonomy of social skill interventions that forms a helpful guide for synthesizing strategies. According to McConnell, social skill interventions can be divided into five categories: (1) environmental modifications, (2) child-specific interventions, (3) collateral skills interventions, (4) peer-mediated interventions, and (5) comprehensive interventions. Environmental modifications involve modifications to the physical and social environment that promote social interactions between youth with ASD and their peers. Child-specific interventions involve the direct instruction of social behaviors, such as initiating and responding. Collateral skill interventions involve strategies that promote social interactions by delivering training in related skills, such as play behaviors and language, rather than training in specific social behaviors. Peer-mediated interventions involve training nondisabled peers to direct and respond to the social behaviors of youth with ASD. Finally, comprehensive interventions involve social skill interventions that combine two or more of the aforementioned intervention categories.

This section reviews SST strategies that have been empirically supported by research. The review does not represent an all-inclusive list of treatment modalities available for individuals with ASD. Instead, we focus exclusively on child-specific interventions or strategies that directly target the social behaviors of youth with ASD. Child-specific interventions were chosen because this category of intervention is delivered most commonly by practitioners in clinical settings. McConnell [14] stated that child-specific interventions include:

> (a) general instructional interventions to increase knowledge and improve social problem solving (including social stories), (b) high density reinforcement to 'prime' social responding, (c) social skills training, (d) adult-mediated prompting and reinforcement, [and] (e) various generalization promotion techniques, (particularly self-monitoring).

The following section summarizes SST strategies from each of these areas of programming, including social stories, video modeling interventions, social problem solving, pivotal response training, scripting procedures, computer-based interventions, priming procedures, prompting procedures, and self-monitoring. The section provides a summary of each intervention modality and a sampling of research studies that have documented their use with youth with ASD.

Social stories

A social story [15] is a commonly used strategy to teach social skills and social rules to youth with ASD. A social story presents social concepts and rules to children in the form of a brief story. A social story may be used to teach a number of social and behavioral concepts, such as initiating

interactions, making transitions, attending a birthday party, or going on a field trip. Gray emphasizes that the story should be written in response to the child's personal need and that the story should be something the child wants to read on his or her own (depending upon ability level). She also stresses that the story should be commensurate with the child's ability and comprehension level.

Sansosti and colleagues [16] conducted a research synthesis of eight social story intervention studies. The researchers concluded that a social story is an effective intervention strategy for addressing the social, communicative, and behavioral functioning of youth with ASD. Kuoch and Mirenda [17] created social stories for three young males with ASD. The researchers wrote individual social stories for each child, and these stories were read to the children before situations where problem behavior typically occurred. Interventionists responded to problem behaviors by providing corrective, verbal feedback. All three children immediately reduced their rate of problem behaviors when the social story was implemented. Hagiwara and Myles [18] implemented an intervention using computer-based social stories for three individuals with ASD. During the school day, the elementary school children read and listened to stories targeting specific tasks on the computer screen, and then watched a brief movie clip showing them performing the task.

Video modeling interventions

A video modeling intervention typically involves an individual watching a video demonstration of positive behavior and then imitating the behavior of the model. Video modeling interventions integrate a powerful learning modality for children with ASD (visually cued instruction) with a widely investigated intervention strategy (modeling). Video self-modeling (VSM) is a specific application of video modeling where the individual learns by watching his or her own efficacious behavior. Video modeling and VSM have been used across multiple disciplines and populations to teach a wide variety of skills, including motor behaviors, social skills, communication skills, self-monitoring, functional skills, vocational skills, athletic skills, and skills related to emotional regulation [19].

Results of a recent meta-analysis suggest that video modeling and VSM are highly effective intervention strategies for addressing social-communication skills, behavioral functioning, and functional skills in youth with ASD [20]. Results demonstrate that video modeling and VSM effectively promote skill acquisition and that skills acquired via video modeling and VSM are maintained over time and transferred across persons and settings. A number of studies examined the efficacy of video modeling and VSM interventions in teaching social skills and play behaviors to youth with ASD. In one case, Bellini and colleagues [21] used VSM to increase social engagement of preschool children with ASD. The researchers recorded the children in a free play activity within their preschool classroom. Teachers were instructed to

prompt and cue the children with ASD to interact with peers. The prompts and cues delivered by the teacher were subsequently edited out of the video to depict the children effectively and independently interacting with peers. The children viewed one video each school day for 4 weeks. Increases in social engagement were substantial and rapid, and were maintained after the videos were no longer shown. Buggey [22] examined the effects of VSM across a variety of social behaviors including language, social initiations, tantrums, and pushing behaviors. The various interventions primarily involved scripted role-playing procedures and, in one case, the recording of naturalistic behaviors. All five participants exhibited immediate and significant gains in social-communication and behavioral functioning. In addition, gains were maintained after the interventions were withdrawn.

Social problem solving

Many youth with ASD have difficulties interpreting and analyzing social situations. These difficulties are due to a number of factors, including lack of self-awareness, failure to read nonverbal and contextual cues, difficulties with perspective taking, and failure to understand social rules. These difficulties also stem from a lack of necessary schema to effectively analyze social situations. Social problem solving (SPS) refers to analyzing and interpreting social situations. SPS requires the child to make inferences based on available contextual cues. Youth with ASD routinely struggle with SPS because of difficulties reading nonverbal behavior (eg, facial expression and body language) and their inability to simultaneously attend to multiple contextual cues in their environment.

Research has demonstrated that SPS can be taught to youth with ASD [23]. Many different methods and techniques have been used to facilitate the development of social reasoning in youth with and without ASD [24]. Bernard-Opitz and colleagues [23] had children with ASD perform SPS tasks on a computer program called ''I can Problem-Solve.'' Children were presented with social problems and choices of possible solutions. After several sessions, the children improved at problem solving, and appeared to enjoy using the program. A meta-analysis conducted by Beelman and colleagues [25] found that SPS strategies were effective in increasing performance on social problem tasks. However, a major limitation noted by the researchers was that these increases in SPS ability had no carryover effect to other areas of social functioning, such as specific social behaviors or skills. That is, SPS strategies may increase SPS, but their impact on social skills and social competence is questionable.

Pivotal response training

Pivotal response training (PRT) [26] is an intervention program based on the principles of applied behavioral analysis. PRT is used in natural

environments and capitalizes on the availability of naturally occurring reinforcers. PRT targets pivotal behaviors, which are behaviors that lead to widespread changes in other behaviors and that facilitate transfer of skills to multiple settings and collateral improvements in nontargeted behaviors. PRT targets four pivotal areas: responsiveness to multiple cues, initiation, motivation, and self-management. PRT teaches children to attend and respond to multiple cues in the environment. Intervention in this area teaches the child to select cues that are relevant in a given context or situation. Intervention in the initiation area teaches the child to effectively initiate interactions with others. Intervention in the motivation area addresses the child's lack of motivation related to social situations. Intervention includes giving the child a choice in activity, using natural reinforcers, and reinforcing reasonable attempts at interacting. Interventions in self-management teach the child to be more independent and less reliant on prompts from others in his or her environment.

The efficacy of PRT has been supported by numerous research studies. Humphries [27] conducted a research synthesis of 13 studies that investigated the effectiveness of PRT. Humphries concluded that PRT is an effective strategy for addressing the behavior, communication, and social functioning of youth with ASD. Stahmer [28] used PRT with seven preschool-aged males either in school or at home to teach them to engage in symbolic play behaviors. The PRT occurred three times a week. After the training, each of the children was able to engage in more symbolic play and in more complex play. Symon [29] trained the parents of young males with ASD to perform PRT techniques during a weeklong intervention program. After the parent intervention, children's social communication and behaviors improved during their interactions with caregivers.

Scripting procedures

Scripting involves the presentation of a structured "script" to the child that provides an explicit description of what the child will say or do during a social interaction [30]. The script may provide a narrative of what to say during a conversation, or what to do during an activity. The script may contain the entire sequence of the interaction, or only the initiation. For instance, the child might be taught a script for joining in an activity with a peer who is also taught to respond in a scripted fashion. The benefits of scripting for individuals with ASD have been demonstrated in research involving both conversational scripts [31] and play scripts [32].

A major limitation of scripting is that the child may become dependent upon the script and be unable to engage in spontaneous, unscripted interactions. Script-fading is a research-based practice designed to address this limitation [33]. Script-fading involves the introduction of a script to facilitate an increase in social interactions, and then a systematic fading of the script over time to promote maintenance and generalization. Goldstein and Cisar [34]

used script-training with three boys with ASD in the preschool classroom. Each student was put into a group with two typical peers. The groups were taught one sociodramatic script at a time, each of which had three roles. The trainer prompted the students to complete each script, moving to the next script once students were 80% correct or had spent 10 training sessions on a script. Both the students with and without ASD involved in the intervention had significantly improved social and communicative behavior in free play following the intervention. Stevenson and colleagues [35] used audiotaped scripts with four boys with ASD ages 10 to 15. Each boy was trained on imitating four- and five-word audiotaped scripts. The scripts were introduced in the classroom and then systematically faded. Recipients of the interactions responded to the students with elaborations of their statements or questions. All students increased speech of both scripted and unscripted statements following the intervention.

Computer-based interventions

Several methods of computer-based instruction have been created and implemented to teach children with delays in theory-of-mind development to acquire social cognitive skills. Programs, techniques, and classes have demonstrated positive outcomes in regards to theory-of-mind and perspective-taking skills. Various virtual environments, including computer-based interventions, have been used effectively to teach social skills to individuals with ASD [36–38].

Silver and Oakes [39] looked at the effects of a computer intervention on emotion recognition and prediction in youth with ASD. The computer presented a sequential progression of exercises involving facial expression recognition, situations that trigger emotions, characters wanting something and receiving something (sometimes, but not always, the same thing), mental states that trigger emotions, and likes/dislikes and possibly related events. Children using the program showed significant improvement both in the program and also on other assessment measures, including emotion-recognition cartoons and strange stories. Two studies have examined the effectiveness of *Mind Reading,* an interactive computer software program designed to teach individuals to recognize emotions through the use of video clips, photographs, voice recordings, lessons, and games involving individuals displaying a range of emotions [40,41]. Golan and Baron-Cohen [40] found that adults with ASD that used the program independently for at least 10 weeks showed marked improvement in recognizing emotions in pictures and voices presented similarly to the computer program, but had little positive change when presented with photographs of individual's eyes or film clips. Lacava and colleagues [41] found that youth with ASD who used the software for an average of 10.5 hours over 10 weeks showed small but statistically significant improvements in emotion recognition for faces and voices.

Priming procedures

Priming refers to the ''incidental activation of knowledge structures'' [42], which facilitates memory recall or behavioral performance. Social cognitions and social behaviors can be primed by presenting cognitive or behavioral ''primes'' just before performance of the skill or behavior in the natural environment. Cognitive priming strategies can be either visual (eg, pictures, videos, modeling, or visual prompts) or verbal instruction (eg, verbal description of the behavior, discussion of the behavior, or verbal prompts). Behavioral priming strategies involve behavioral rehearsal, or practicing the skill or behavior just before performing it in the natural environment.

The positive effects of priming to facilitate social behavior is supported by researchers who used priming to increase the social initiations of preschool children with ASD [43] and to decrease problem behaviors in the classroom [44]. Video priming has been used to reduce problem behaviors during transitions for youth with ASD [45]. The researchers selected transitions in settings deemed most problematic by the children's parents. The researchers then videotaped the settings to show the environment just as the child would see it (eg, moving through the store, getting ready in the morning). The children were not depicted in the video. Priming procedures are useful because they activate knowledge structures and facilitate social cognition and social behaviors for children with ASD.

Prompting procedures

Prompts are highly effective in facilitating child–adult and child–child interactions for youth with ASD [5,14]. Prompts are supports and assistance provided to the child to help him or her acquire skills and successfully perform behaviors. Prompts can be used to teach new social skills (in the case of physical and modeling prompts) and to improve previously acquired skills. In addition, they may be used with novice or advanced performers, in clinical and group settings, with verbal children or with nonverbal children, and with preschoolers or with adults. Prompts may be delivered by adults or by other children. A limitation of prompting strategies is that the child with ASD may limit social interactions to only instances in which prompting is provided. As such, a prompt-fading plan is typically implemented to systematically fade prompts.

Research on prompting procedures highlights the effectiveness of this modality. A school-based study used teacher prompting to increase social interactions for two males with ASD [46]. Students were individually brought into a room with typical peers who had been trained to respond to the target student's initiations but not to initiate to the student. They were seated within reach of several toys and instructed to play. The teacher was instructed to use increasingly intrusive prompts to encourage the target students to initiate to peers. One of the males increased his initiations to peers, while the other student increased social interactions but failed to

increase initiations. Taylor and Levin [47] used two different kinds of prompting with a 9-year-old boy with ASD. In the first phase, an adult prompted the student to initiate verbal statements every minute. In the second phase, the boy was given a vibrating pager set to vibrate every 60 seconds, and instructed to talk about his play activities when it vibrated. Tactile prompting through the use of the vibrating pager was found to be highly effective in increasing the student's verbal initiations.

Self-monitoring

Self-monitoring strategies have demonstrated considerable effectiveness for teaching youth with and without disabilities to both monitor and regulate their own behavior [48]. This is a particularly important area to address in youth with ASD because of their significant deficits in self-awareness. Lack of self-awareness diminishes the child's ability to regulate and evaluate the quality of his or her behavioral performance. The strength of self-monitoring strategies is that they support generalization of skills by requiring children to independently monitor their own behavior. The self-recording of behavior can be used during the behavioral performance or after the performance (or both). Strategies can target a number of externalizing behaviors, such as time-on-task, work completion, and disruptive behaviors, as well as internal processes, such as thoughts (self-talk) and feelings (both positive and negative affect). Self-monitoring strategies may involve having the child record occurrences, duration, and frequencies of behaviors (whether the behavior was performed, for how long, how frequently it was performed) and the quality of the behavioral performance (how well the behavior was performed).

Self-monitoring strategies have been the focus of a number of research studies investigating the social and behavioral functioning of youth with ASD [49–51]. Shearer and colleagues [49] and Strain and colleagues [50] effectively used self-monitoring to increase the social interactions of young children with ASD. Both studies reported maintenance and generalization of targeted skills. Coyle and Cole [51] used self-monitoring in combination with VSM to decrease off-task behavior in school-aged children with ASD. The researchers video-recorded the children while they engaged in classroom tasks, then edited the video to include only on-task behavior. The video was then used to train the children to use a self-monitoring procedure targeting on-task behavior. The intervention led to substantial decreases in off-task behavior, and results were maintained after the intervention was removed.

Assessment of social functioning

Evaluation of social skills and social competence is a critical element of SST [52]. The purpose of the social skills assessment is to identify skill deficits that will be the direct target of the intervention, and to monitor the

outcomes of the SST program. Gresham [12] divides social skills assessment methods into three categories that measure different levels of social functioning.

Type I measures include rating scales and interviews designed to measure social competence or perceptions of social performance. Type I measures are the most socially valid assessment measures because they directly measure the impressions of key stakeholders. That is, the results of type I measures represent the judgments of parents and teachers. As such, treatment objectives developed from these measures are likely to be accepted and viewed as socially acceptable by these key stakeholders. A major advantage of type I measures is their ability to efficiently obtain information regarding social behavior from a variety of sources and across a variety of settings. A major disadvantage of type I measures is that they are often not sensitive to short-term changes in behavior. For instance, the child might demonstrate an increase in the target behaviors without key stakeholders noticing these changes.

Type II measures involve the direct assessment of the child's social skills or social behaviors. As such, these measures are valuable to progress monitoring and are used extensively in applied research studies involving single-subject methodology. Type II measures are sensitive to small changes in behavior because they are linked directly to the treatment objectives. For instance, if the clinician identifies "joining-in activities with peers" as a treatment objective, he or she would then observe the child to measure whether "joining-in" behavior has increased over the course of the intervention. Determination of treatment effectiveness would then be based on changes in the target behavior.

Type III measures are the least valid assessment measures, but they still have clinical utility. Type III measures involve conducting role-play scenarios or asking questions related to social cognition. For instance, for teaching a child to effectively respond to bullying, the clinician could set up a role-play scenario that requires the child to deal effectively with a bully; or, for teaching perspective taking to a child, the clinician could set up a role-play that requires the child to infer the thoughts or feelings of another person. Though these are important areas to address via intervention, and should be measured via assessment, research has demonstrated that these measures are not related to measures of social competence (type I measures) or measures of social skills (type II measures).

Available assessment tools

Social skills assessment often involves a combination of observations (both naturalistic and structured), interviews (eg, parents, teachers, child), and social skill rating forms (parent, teacher, and self reports). The following section focuses on the use of rating scales as these are most commonly used by researchers and clinicians to measure social competence in youth

with ASD. A major advantage of rating scales is their ability to quickly and efficiently obtain large quantities of information regarding social behavior from a variety of sources and across a variety of settings [53]. This is especially important for clinicians who may not have the opportunity to monitor children in nonclinical settings. The use of rating scales can also increase the social validity of the social skills program when information gleaned from the assessment is linked directly to the development of treatment goals and objectives [12].

The Social Skills Rating System (SSRS) [13] is a widely used measure of social competence. This questionnaire provides information on the social competence of youth ages 3 to 18. The SSRS has been used in studies examining the social skills of individuals with ASD [52,54–56]. A limitation of the SSRS (and other well-established social competence measures) in its use with youth with ASD is that the measure was designed for a broad population of children. Thus, few of the items address the unique pattern of social behavior exhibited by youth with ASD, which limits the questionnaire's utility as an intervention planning tool. Another major disadvantage of most rating scales is that they are often insensitive to small changes in behavior [12,53]. Use of norm-referenced rating scales may not detect improvements in social behavior in youth with ASD, at least initially, because the normative group is comprised of a general population of children. Though the child with ASD might be making steady improvements in social behavior, his or her standard score on the rating scale may remain quite low because the child's behavior is being compared with that of a general population of children.

The Social Responsiveness Scale (SRS) [57] is currently the only commercially available social competency measure designed specifically for youth with ASD. The SRS is a well-studied instrument with sound psychometric properties [58,59]. The SRS was designed as a diagnostic tool and as a treatment-monitoring tool. The SRS is a 65-item measure that covers social behaviors in addition to items related to other areas of autistic symptomatology, such as preoccupations, and other repetitive, stereotypical behaviors. The SRS contains five subscales: Receptive, Cognitive, Expressive, Motivational Aspects of Social Behavior, and Preoccupations. The SRS is based on a normative sample of more than 1600 children (4–18 years of age) from the general population.

The Autism Social Skills Profile (ASSP) [60] is a new assessment tool that provides a comprehensive measure of social competence for youth with ASD. The ASSP was designed for use as an intervention planning and monitoring tool. The items on the ASSP represent a broad range of social behaviors typically exhibited by individuals with ASD, including initiation skills, social reciprocity, perspective-taking, and nonverbal communication skills. The ASSP was designed for use with youth with ASD between the ages of 6 and 17. A preliminary analysis of the psychometric properties of the ASSP with 340 youths with ASD indicated that the instrument has strong

validity and reliability for this age group [61]. Factor analysis revealed three underlying dimensions, or subscales, for the ASSP: Social Reciprocity, Social Participation/Avoidance, and Detrimental Social Behaviors. Though it contains only 49 items, the ASSP provides a thorough and comprehensive assessment of social competence. For instance, the ASSP has over 10 items that measure different social initiation skills for youth with ASD (eg, ''Joins in activities with peers,'' ''Initiates greetings,'' ''Asks others to join him/her in activities,'' ''Asks questions about other persons''). This precision is essential to the elucidation of specific skills that will be the direct target of intervention.

Meta-analytic reviews of social skills training

Gresham and colleagues [12] concluded that meta-analytic reviews of SST have yielded a wide variety of results, ranging from ineffectual to highly effective interventions. Based on their review of the literature, the investigators provided a number of recommendations for promoting effective social skill interventions. First, the researchers recommended that SST should be implemented more frequently and more intensely than what is typically implemented. They concluded that 30 hours of instruction, spread over 10 to 12 weeks, is not enough. Second, they concluded that a major weakness of social skill interventions is a failure to produce adequate maintenance and generalization effects. Gresham and colleagues attributed this, in part, to the fact that social skills training often takes place in ''contrived, restricted, and decontextualized'' settings, such as resource rooms or other ''pullout'' settings. Third, the researchers posited that the ineffectiveness of many social skills programs is a result of the interventionists' failure to match the social skill strategy to the type of skill deficit presented. This information allows the interventionist to determine whether he or she should teach new skills to the child or enhance the performance of existing skills. In addition, the researchers concluded that the traditionally weak treatment effects of SST may be the result of interventions that fail to link assessment data with the development of intervention objectives. Assessments that lack reliability and validity hinder the clinician's ability to identify relevant and critical skills to teach and to accurately monitor progress. Finally, Gresham and colleagues found that few meta-analytic studies reported evidence that interventions were implemented as intended. This absence of fidelity data makes it extremely difficult to conclude whether a social skill intervention was ineffective due to an ineffectual intervention strategy or because it was implemented poorly.

Bellini and colleagues [62] conducted the only meta-analysis of SST for youth with ASD. The meta-analysis included 55 published research studies investigating school-based SST for youth with ASD. The reviewed studies included 147 students with ASD ranging from preschool to secondary school. The purpose of the meta-analysis was to measure the collective

outcomes of school-based SST for youth with ASD, and to identify factors that lead to more beneficial outcomes. Results of the meta-analysis suggested that school-based SST is only minimally effective for children with ASD. Specifically, SST produced low treatment effects and low generalization effects across persons and settings. Moderate maintenance effects were observed, suggesting that when gains were made via SST, the gains were maintained after the intervention was withdrawn. The low treatment effects observed in the study are consistent with the results of previous meta-analyses conducted on SST for other populations of children [63–65].

Similar intervention, maintenance, and generalization effects were observed among interventions measuring collateral skills (eg, play skills, joint attention, and language skills) and interventions measuring specific social behaviors (eg, social initiations, social responses, and duration of interaction). There were no significant differences between the outcomes of studies that implemented group interventions and studies that implemented individual interventions, nor were there significant differences across the various types of interventions (eg, environmental modifications, child-specific interventions, collateral skills interventions, peer-mediated interventions, and comprehensive interventions). The length and duration of interventions varied considerably across studies. Hours of intervention ranged from 2.5 to 28 hours (median 7.25 hours), well below the dosage recommendation of Gresham and colleagues. Only 14 of the studies in the meta-analysis measured whether the intervention was implemented as intended, which makes interpretation of results problematic. Finally, only one study systematically matched the type of intervention strategy with the type of skill deficit exhibited by participants. An important finding of the study was that students receiving SST in their typical classroom setting had substantially higher treatment, maintenance, and generalization effects than did students who received services in a pullout setting. This finding supports the recommendation of Gresham and colleagues to deliver SST in the child's natural environment.

The results of the meta-analysis help to elucidate factors that lead to more beneficial social outcomes for youth with ASD. In addition, by synthesizing the results of the Bellini and colleagues meta-analysis and the Gresham and colleagues study, we are better able to determine the ingredients for effective SST, and thus make the following recommendations for programming: (1) Increase the dosage of social skill interventions, (2) provide instruction within the child's natural setting, (3) match the intervention strategy with the type of skill deficit, and (4) ensure intervention fidelity.

Gresham and colleagues noted that 30 hours of SST for 10 to 12 weeks is not enough for effective interventions. Though research has yet to identify specific dosage guidelines for SST for youth with ASD who exhibit significant social skill deficits, the recommendation by Gresham and colleagues should be considered a minimum dosage requirement for this population. This recommendation should not be interpreted as advocating for 30 hours

of one-on-one SST with a clinician. On the contrary, SST should not stop the moment the child leaves the clinic facility; it should be ubiquitous. SST should be taught across many settings and with as many people as possible, including clinicians, family members, educators, and peers. Every setting the child enters provides an opportunity to teach social skills. Training across a variety of persons and settings avoids the common pitfall of many SST programs that train exclusively in contrived settings. It is also important to note that this recommendation does not preclude clinicians from implementing SST in clinical settings. However, as discussed previously, clinicians in these settings should look for opportunities to promote transfer of skills across other settings and persons. This is effectively done by partnering with parents, educators, and other service providers via a reciprocal exchange of information and resources. Matching strategy with type of skill deficit requires the clinician to discern between a skill acquisition deficit and performance deficit. A performance deficit refers to a skill or behavior that is present, but not demonstrated or performed, whereas a skill-acquisition deficit refers to the absence of a particular skill or behavior. This is a critical component of SST as it guides the clinician's selection of intervention strategies. For instance, if the child does not possess the requisite knowledge to join in an activity with peers (skill-acquisition deficit), then the clinician should select strategies designed to teach a new skill. If the child has the ability to join in activities, but fails to do so (performance deficit), then the clinician should select strategies to enhance the performance of this existing skill. Bellini [52] provides a comprehensive discussion of techniques for discerning between a skill-acquisition deficit and performance deficit and outlines a number of SST strategies for targeting these two types of deficits. Finally, researchers and clinicians should strive to collect data on treatment fidelity. Lack of treatment fidelity data makes it virtually impossible to determine if the low treatment effects were the result of ineffectual strategies, or of poorly implemented strategies. Given that few clinicians and educators receive adequate training in SST as part of their graduate or medical school training, it is probable that the failure of many SST programs is a result of poorly implemented strategies. Clinicians implementing SST program may also need to receive ongoing continuing education to develop and hone their skills in this area.

Summary

Social skill deficits are a pervasive and enduring feature of ASD. As such, SST should be a critical component of programming for youth with ASD. An essential first step of SST is to identify the skills that will be targeted during intervention. This is done through social skills assessment. The use of reliable and valid rating forms helps the clinician identify skills to target, and provides a measure of treatment progress. A number of SST strategies

are available to clinicians with varying degrees of empiric support. The results of meta-analytic research suggest that SST programs should be intensive, be implemented in natural settings, include strategies that match type of skill deficit, and ensure intervention fidelity.

References

[1] Attwood T. Asperger's syndrome: a guide for parents and professionals. Philadelphia: Kingsley; 1998.
[2] Baron-Cohen S. The autistic child's theory of mind: a case of specific developmental delay. J Child Psychol Psychiatry 1989;30:285–97.
[3] Brown J, Whiten A. Imitation, theory of mind and related activities in autism: an observational study of spontaneous behaviour in everyday contexts. Autism 2000;4:185–205.
[4] Dawson G, Fernald M. Perspective taking ability and its relationship to the social behavior of autistic children. J Autism Dev Disord 1987;17:487–9.
[5] Rogers S. Interventions that facilitate socialization in children with autism. J Autism Dev Disord 2000;30:399–409.
[6] American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th edition. Washington, DC: American Psychiatric Association; 2000. p. 75.
[7] World Health Organization. The ICD-10 classification of mental and behavioural disorders. Geneva (Switzerland): World Health Organization; 1992.
[8] Bellini S. The development of social anxiety in high functioning adolescents with autism spectrum disorders. Focus Autism Other Dev Disabl 2006;21:138–45.
[9] Tantam D. Psychological disorder in adolescents and adults with Asperger syndromeAutism 2000;4:47–62.
[10] Welsh M, Park RD, Widaman K, et al. Linkages between children's social and academic competence: a longitudinal analysis. J Sch Psychol 2001;39(6):463–81.
[11] Elliot SN, Gresham FM. Social skills interventions for children. Behav Modif 1993;17: 287–313.
[12] Gresham FM, Sugai G, Horner RH. Interpreting outcomes of social skills training for students with high-incidence disabilities. Teaching Exceptional Children 2001;67:331–44.
[13] Gresham FM, Elliot SN. Social skills rating system manual. Circle Pines (MN): American Guidance Service; 1990.
[14] McConnell SR. Interventions to facilitate social interaction for young children with autism: review of available research and recommendations for educational intervention and future research. J Autism Dev Disord 2002;32:351–72.
[15] Gray C. The new social story book: illustrated edition. Arlington (TX): Future Horizons; 2000.
[16] Sansosti FJ, Powell-Smith KA, Kincaid D. A research synthesis of social story interventions for children with autism spectrum disorders. Focus Autism Other Dev Disabl 2004;19: 194–204.
[17] Kuoch H, Mirenda P. Social story interventions for young children with autism spectrum disorders. Focus Autism Other Dev Disabl 2003;18(4):219–27.
[18] Hagiwara T, Myles BS. A multimedia social story intervention: teaching skills to children with autism. Focus Autism Other Dev Disabl 1999;14(2):82–95.
[19] Dowrick P. A review of self-modeling and related interventions. Appl Prev Psychol 1999;8: 23–39.
[20] Bellini S, Akullian J. A meta-analysis of video modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. Except Child 2007;73: 261–84.
[21] Bellini S, Akullian J, Hopf A. Increasing social engagement in young children with autism spectrum disorders using video self-modeling. School Psych Rev 2007;36:80–90.

[22] Buggey T. Video self-modeling applications with children with autism spectrum disorder in a small private school. Focus Autism Other Dev Disabl 2005;20(1):52–63.
[23] Bernard-Opitz V, Sriram N, Nakhoda-Sapuan S. Enhancing social problem solving in children with autism and normal children through computer-assisted instruction. J Autism Dev Disord 2001;31:377–84.
[24] Elias MJ, Butler LB, Bruno EM, et al. Social decision making/social problem solving: a curriculum for academic, social, and emotional learning. Champaign (IL): Research Press; 2005.
[25] Beelman A, Pfingsten U, Losel F. Effects of training social competence in children: A meta-analysis of recent evaluation studies. J Clin Child Adolesc Psychol 1994;213:260–71.
[26] Koegel RL, Koegel LK. Pivotal response treatment for autism: communication, social, academic development. Baltimore (MD): Paul Brookes; 2006.
[27] Humphries A. Effectiveness of PRT as a behavioral intervention for young children with ASD. Bridges practice-based research syntheses 2003;2(4):1–10.
[28] Stahmer AC. Teaching symbolic play skills to children with autism using pivotal response training. J Autism Dev Disord 1995;25(2):123–41.
[29] Symon JB. Expanding interventions for children with autism: parents as trainers. Journal of Positive Behavior Interventions 2005;7(3):159–73.
[30] Mayo P, Waldo P. Scripting: social communication for adolescents. Eau Claire (WI): Thinking Publications; 1994.
[31] Loveland KA, Tunali B. Social scripts for conversational interactions in autism and Down syndrome. J Autism Dev Disord 1991;21:177–86.
[32] MacDonald R, Clark M, Garrigan E. Using video modeling to teach pretend play to children with autism. Behav Interv 2005;20(4):225–38.
[33] Krantz PJ, McClannahan LE. Teaching children with autism to initiate to peers: effects of a script-fading procedure. J Appl Behav Anal 1993;26:121–32.
[34] Goldstein H, Cisar CL. Promoting interaction during sociodramatic play: teaching scripts to typical preschoolers and classmates with disabilities. J Appl Behav Anal 1992;25(2):265–80.
[35] Stevenson CL, Krantz PJ, McClannahan LE. Social interaction skills for children with autism: a script-fading procedure for nonreaders. Behav Interv 2000;15(1):1–20.
[36] Mitchell P, Parsons S, Leonard A. Using virtual environments for teaching social understanding to 6 adolescents with autistic spectrum disorders. J Autism Dev Disord 2007;37: 589–600.
[37] Moore D, Cheng Y, McGrath P, et al. Collaborative virtual environment technology for people with autism. Focus Autism Other Dev Disabl 2005;20(4):231–43.
[38] Parsons S, Leonard A, Mitchell P. Virtual environments for social skills training: comments from two adolescents with autistic spectrum disorder. Computers & Education 2006;47: 186–206.
[39] Silver M, Oakes P. Evaluation of a new computer intervention to teach people with autism or Asperger syndrome to recognize and predict emotion in others. Autism 2001;5(3):299–316.
[40] Golan O, Baron-Cohen S. Systemizing empathy: teaching adults with Asperger syndrome or high-functioning autism to recognize complex emotions using interactive multimedia. Dev Psychopathol 2006;18:591–617.
[41] Lacava PG, Golan O, Baron-Cohen S, et al. Using assistive technology to teach emotion recognition to students with Asperger syndrome. Remedial and Special Education 2007;28(3): 174–81.
[42] Bargh JA, Chen M, Burrows L. The automaticity of social behaviour: direct effects of trait concept and stereotype activation on action. J Pers Soc Psychol 1996;71:230–44.
[43] Zanolli K, Daggett J, Adams T. Teaching preschool age autistic children to make spontaneous initiations to peers using priming. J Autism Dev Disord 1996;2:407–22.
[44] Koegel LK, Koegel RL, Frea W, et al. Priming as a method of coordinating educational services for students with autism. Lang Speech Hear Serv Sch 2003;34:228–35.
[45] Schreibman L, Whalen C, Stahmer A. The use of video priming to reduce disruptive transition behavior in children with autism. Journal of Positive Behavior Interventions 2000;2:3–12.

[46] Gunter P, Fox JJ, Brady MP, et al. Nonhandicapped peers as multiple exemplars: a generalization tactic for promoting autistic students' social skills. Behav Disord 1988;13(2):116–26.
[47] Taylor BA, Levin L. Teaching a student with autism to make verbal initiations: effects of a tactile prompt. J Appl Behav Anal 1998;31(4):651–4.
[48] Carter JF. Self management: education's ultimate goal. Teaching Exceptional Children. 1993;25(3):28–33.
[49] Shearer DD, Kohler FW, Buchan KA, et al. Promoting independent interactions between preschoolers with autism and their nondisabled peers: an analysis of self-monitoring. Early Educ Dev 1996;7:205–20.
[50] Strain PS, Kohler FW, Storey K, et al. Teaching preschoolers with autism to self-monitor their social interactions. J Emot Behav Disord 1994;2:78–88.
[51] Coyle C, Cole P. A videotaped self-modeling and self-monitoring treatment program to decrease off-task behaviour in children with autism. J Intellect Dev Disabil 2004;29(1):3–15.
[52] Bellini S. Building social relationships: a systematic approach to teaching social interaction skills to children and adolescents with autism spectrum disorders and other social difficulties. Shawnee Mission (KS): Autism Asperger Publishing; 2006.
[53] Elliott SN, Malecki CK, Demaray MK. New directions in social skills assessment and intervention for elementary and middle school students. Exceptionality 2001;9:19–32.
[54] Bellini S. Social skills and anxiety in higher functioning adolescents with autism spectrum disorders. Focus Autism Other Dev Disabl 2004;19(3):78–86.
[55] Koning C, Magill-Evans J. Social and language skills in adolescent boys with Asperger syndrome. Autism 2001;5:23–36.
[56] Ozonoff S, Miller JN. Teaching theory of mind—a new approach to social skills training for individuals with autism. J Autism Dev Disord 1995;25(4):415–33.
[57] Constantino JN, Gruber CP. The Social responsiveness scale (SRS) manual. Los Angeles (CA): Western Psychological Services; 2005.
[58] Constantino JN, Davis SA, Todd RD, et al. Validation of a brief quantitative measure of autistic traits: comparison of the social responsiveness scale with the autism diagnostic interview—revised. J Autism Dev Disord 2003;33:427–33.
[59] Constantino JN, Gruber CP, Davis S, et al. The factor structure of autistic traits. J Child Psychol Psychiatry 2004;45:719–26.
[60] Bellini S. The Autism social skills profile. Shawnee Mission (KS): Autism Asperger Publishing, in press.
[61] Bellini S, Hopf A. Assessing the psychometric properties of the autism social skills profile. Focus Autism Other Dev Disabl 2007;22:80–7.
[62] Bellini S, Peters J, Benner L, et al. A meta-analysis of school-based social skill interventions for children with autism spectrum disorders. Remedial and Special Education 2007;28: 153–62.
[63] Forness SR, Kavale KA. Treating social skills deficits in children with learning disabilities: a meta-analysis of the research. Learn Disabil Q 1996;19:2–13.
[64] Mathur SR, Kavale KA, Quinn MM, et al. Social skills interventions with students with emotional and behavioral problems. A quantitative synthesis of single subject researchBehav Disord 1998;23:193–201.
[65] Quinn MM, Kavale KA, Mathur SR, et al. A meta-analysis of social skills interventions for students with emotional and behavioral disorders. J Emot Behav Disord 1999;7:54–64.